DOCKET FILE COPY ORIGINAL ORIGINAL

**BEFORE THE**

# Federal Communications Commission

**WASHINGTON, D.C. 20554**



| | | |
|---|---|---|
| In the Matter of | | |
| Amendment of the Commission's Rules With regard to the 3650-3700 MHz Government Transfer Band | ) | ET Docket No. 98-237 |
| The 4.9 GHz Band Transferred from Federal Government Use | ) | WT Docket No. 00-32 |

## COMMENTS

Lockheed Martin Corporation ("LMC") herein files its Comments in response to the Commission's Second Notice of Proposed Rulemaking ("Second NPRM") in the above-captioned proceeding.

In its Comments, LMC will respond to two major areas of inquiry raised by the Commission in the Second NPRM related to the use of the extended C-band and its use by the FSS. First, LMC supports the Commission's proposal to amend Section 25.202(g) of its Rules to permit authorization of TT&C operations in the extended C-bands (3650-3700 MHz and 5850-5925 MHz) for FSS systems operating outside of the 3650-3700 MHz band. Second, LMC agrees with the Commission's proposed coordination procedures for terrestrial service operations located within the 200-kilometer coordination zones of grandfathered FSS earth station facilities. LMC also responds to several other inquiries relating to operation of FSS ground segment in these bands.

### A. TT&C Operations In The 3650-3700 MHz Band Are Integral For FSS Systems Operating At Ka-Band And Above.

Of the issues addressed in the *Second NPRM*, LMC believes that the portions dealing with future use of the 3650-3700 MHz band for FSS TT&C are the most critical. LMC therefore supports the Commission's proposal to amend Section 25.202(g) of its rules to permit authorization of TT&C operations in the extended C-bands (3650-3700 MHz and 5850-5925 MHz) for FSS systems operating outside of the 3650-3700 MHz band.

TT&C operations in the 3650-3700 MHz band would be authorized by the Commission upon "a particularized showing of need" and would be "primary if conducted at grandfathered FSS sites and secondary at new sites." [1] The Commission seeks comment on the types of showings or circumstances when such TT&C operations should be authorized.

LMC notes that the Commission has already received many comments regarding the need of satellite systems operating in the Ka-band and above for C-band TT&C frequencies because of the more favorable signal propagation characteristics and consequently higher reliability.[2] Frequencies at Ka-band and above are far more susceptible to rain-fade and other types of atmospheric blocking that can disrupt downlink transmissions, and are therefore ill-suited to critical functions such as TT&C.

The Commission nonetheless questions whether higher TT&C reliability can be achieved at Ka-band with earth station diversity. An operator cannot achieve sufficiently higher TT&C reliability through the use of earth station diversity at Ka-band. The same, less favorable propagation characteristics at Ka-band will exist regardless of the number of Ka-band TT&C sites available in a diversity scheme. While geographical separation of sites may provide some increased reliability due to the probability that weather conditions may be different at the diverse

[1] *Id.* at 52 (¶ 130-131).

sites, the improvement from diversity does not justify the extremely high costs entailed in establishing the high level of redundancy required. Indeed, the costs to construct additional Ka-band TT&C earth stations or to modify existing C-band TT&C earth stations to achieve diversity (at Ka-band and above) are likely to be prohibitive, thus frustrating the overall goal of facilitating the delivery, let alone cost-efficient delivery, of broadband services to consumers.

Given these realities, there would not appear to be any basis for requiring a Ka- or V-band applicant to demonstrate a "particularized need" for C-band TT&C, in that all such operators have a generalized need for access to out-of-band TT&C frequencies, and the C-band is ideally suited for this purpose. The better propagation characteristics, wider acquisition beamwidth, higher reliability and avoidance of costly earth station diversity make the 3650-3700 MHz band significantly better for TT&C purposes than the Ka-band and justify its use for this mission critical function. For these reasons, rather than requiring specific showings, the Commission should adopt a general rule permitting Ka-band and V-band systems to employ the 3650-3700 MHz band for TT&C links.

### B. Terrestrial service operations should utilize Appendix S7 ITU Radio Regulation interference analysis within the 200-kilometer coordination zones of grandfathered FSS earth station.

LMC agrees with the Commission's proposed coordination procedures for terrestrial service operations located within the 200-kilometer coordination zones of grandfathered FSS earth station facilities.[3] The technical information and procedures in Part 25 of the Commission's rules, which are based on Appendix S7 of the ITU Radio Regulations, should be utilized to determine the potential for harmful interference.

---

[2] *Id.* at 52 (¶ 131).
[3] *Id.* at 42-43 (¶ 103).

LMC notes and supports the Commission's proposal to permit "flexibility for FSS earth station use," and to adopt coordination procedures that "take into account any possible future changes to the FSS earth station facilities, including possible future polarization and receive antenna orientation changes."[4] LMC also supports the creation of 200-km coordination zones around FSS sites which should allow for any changes in the antenna orientation above an elevation angle of 15 degrees. However, in Annex A to these Comments, LMC provides an estimate of the coordination distance in the boresight direction using Appendix S7 values[5] with a peak EIRP limit suggested by the Commission for FS services. For attenuation due to rain scatter (Propagation Mode 2 in Appendix S7), and especially for earth stations operating at or below 15 degrees elevation, 390 km may be a more suitable coordination distance in the boresight direction, plus or minus a few degrees in azimuth.[6] However, it must be stressed that complete technical details of the FS or MS transmitters involved would be required for a complete assessment using Appendix S7 analyses.

It should also be noted that under this procedure there are no "a priori" exclusion zones around the earth station as suggested by the Commission[7]; but rather there may be locations within the coordination zones where FS may find it difficult to satisfactorily coordinate with FSS without taking special measures to avoid interference.

---

[4] *Id.* at 43 (¶ 104).
[5] See Appendix S7 of the ITU Radio Regulations.
[6] For Propagation Mode 2 (attenuation subject to rain scatter) in Appendix S7, the coordination zone could vary from 390 km in ITU Rain Zones 2, 3 and4, to 470 km for Rain Zone2, and 540 km for Rain Zone 1.
[7] *Id.* at 42-43 (¶ 103).

### C. FSS earth station reception from out-of-band FS emissions should be more stringent.

The Commission recognizes the need for protection of adjacent band FSS earth station reception in the 3700-4200 MHz band from out-of-band emissions and seeks comment on the proposal to use the limit set forth in Section 101.111 of the Commission's Rules.[8] As detailed in previous comments, [9] LMC continues to support 60 + 10 Log (P) dB as being more appropriate. The requirement should be as stringent as practicable to reduce the need for out-of-band interference coordination. Again, this should be addressed more definitely once service rules are proposed and the technical parameters of the proposed FS operations are established .[10]

### D. There is no need to restrict usage or size of VSATs in the 3700-3720 MHz Band.

LMC agrees with the Commission's finding that there is no need to restrict the usage of VSATs or the size of the antennas used with VSATs in the 3700-3720 MHz band.[11] Permitting use of smaller antennas in this band should promote the deployment of new applications and services for satellite users, particularly those requiring data transmission services for which there is burgeoning demand.

### E. LMC has no objection to removal of footnote US245.

The Commission also seeks comment on the desirability, in the 3650-3700 MHz band, of deleting or modifying footnote US 245, which currently restricts use of this FSS allocation "to international inter-continental systems subject to a case-by-case electromagnetic compatibility analysis."[12] LMC has no objection to removal of the US245 restriction from the allocation table

---

[8] *Id.* at 45 (¶ 111).
[9] See "Comments of COMSAT Corporation", pg. 14, ET-Docket No. 98-237, February 16, 1999.
[10] See "Comments of COMSAT Corporation", pg. 14, ET-Docket No. 98-237, February 16, 1999.
[11] *Id.* at 46 (¶ 113).
[12] *Id.* at 51 (¶ 128).

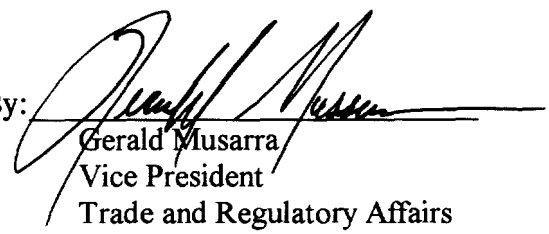
and agrees with the Commission's view that deletion of the footnote restriction may provide "for flexible and efficient use of FSS earth station sites."[13]

## Conclusion

For the foregoing reasons, LMC urges the Commission to take action in this proceeding to facilitate use of the 3650-3700 MHz band for FSS TT&C, adopting rules and policies consistent with the views set forth herein.

Respectfully submitted,

LOCKHEED MARTIN CORPORATION

By: 

Gerald Musarra
Vice President
Trade and Regulatory Affairs
Lockheed Martin Corporation
Crystal Square 2, Suite 403
1725 Jefferson Davis Highway
Arlington, Virginia 22202
(701) 413-5791

Robert Mansbach
Keith Fagan
Attorneys
Lockheed Martin
Global Telecommunications

December 14, 2000

[13] *Id.* at 51 (¶ 128).

## ANNEX A

### Calculation of the Coordination Area using Appendix S7 of the Radio Regulations

Appendix S7 of the Radio Regulations provides a method for the determination of the coordination area around an earth station. The coordination area is determined by calculating the minimum permissible transmission loss L(p) for p% of the time. The Appendix provides a means of calculating the attenuation caused by two different mechanisms: propagation mode (1) which is the tropospheric propagation loss via a near-great circle path, and propagation mode (2) which is attenuation subject to rain scatter due hydrometers;

For propagation mode (1) the minimum transmission loss is expressed by:

$$L_b(p) = P_{t'} + G_{t'} + G_r - P_r(p) \quad \text{.....(dB)}$$

where:

$L_b(p)$: minimum permissible transmission loss, propagation mode (1)

$P_{t'}$ : maximum available transmitting power level (dBW)

$G_{t'}$ : gain (dB relative to isotropic) of the transmitting antenna

$G_r$ : gain (dB relative to isotropic) of the receiving antenna

$P_r(p)$: permissible level of an interfering emission (dBW)

Based on the parameters given in Appendix S7 and the FCC Report and Order & NPRM, the following value of L(p) was found.

$P_{t'}+G_{t'}$ = 10 log (1640) = 32.2 dBW (assumed max. fixed station eirp = 1640 watts, FCC R&O and NPRM § 101)

$P_r(p)$ = 10 log ($kT_eB$) + J + M(p) –W

= - 228.6 + 20 + 60 + 0 + 5 – 0 (using the parameters given in Table II of App. S7)

= -143.6 dBW

Therefore,

$L_b(p)$ = 32.2 + 0 - (-143.6)
= 175.6 dB

assuming $G_r = 0$ dBi ( receive earth station antenna gain at an elevation angle to the horizon of 14.5 degrees )

Assuming $A_h \approx 15$ dB (for a horizon elevation angle of 0.5 deg.) from Figure 1 of Appendix S7 )

$$L_b(p) - A_h = 175.6 + 15 = 160.6 \text{ dB}$$

Using a correction factor (p = 0.001 % of the time) of 1.16 for Zone A, and 1.6 for Zones B and C the resulting coordination distances for propagation mode (1) are;
(Zone A) $\cong$ 197 km,
(Zone B) = 1000 km (maximum coordination distance for Zone B)
(Zone C) $\cong$ 1100 km.

For propagation mode (2), rain scatter, the normalized transmission loss was found to be:

$L_2(0.01) = 179.6$ (dB) ..... (reference §4 of Appendix S7)

The above required transmission loss for propagation mode (2) would result in a rain scatter distance of over 600 km for all of the five rain climatic zones given in Appendix S7. However, based on Table V of Appendix S7, for p = 0.001% the following maximum rain scatter distances would apply; 540 km for rain-climatic zone 1, 470 km for rain climatic zone 2, and 390 km for rain climatic zones 3, 4 and 5.